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# Citation Analysis of Undergraduate Honors Theses

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## Introduction

Librarians often wonder what resources students use for research and whether the library provides access to these resources. At the University of South Alabama (USA), students in the honors program must complete a senior thesis in order to graduate with honors. The library holds these theses, providing a convenient source of bibliographies for examination. Studying these theses provided an unobtrusive manner of investigation. While such theses do not represent the entire undergraduate population's research and writing behavior, they provide a starting point for addressing the above question. Non-honors program students likely encounter the same difficulties in locating and using resources as honors students. The insights into citation behavior and library holdings of information cited in this sampling can then be used to inform decisions about library instruction and outreach to undergraduate students.

Librarians frequently use citation analysis studies to explore and evaluate information use. Such studies can identify the most important journals in a discipline. This method can also guide collection development decisions and cancellation policies. It is also used to determine the proportion of materials cited by researchers in various disciplines, which can be used as an indication of the relative importance of various formats to those fields. This information can then be used in determining library budget allocations for monographs versus serials for different disciplines (Smith 2003).

Such studies frequently examine the citation behavior of faculty, although a few studies explore the habits of students. Sylvia (1998) used psychology research bibliographies from undergraduate and graduate students as one basis for journal selection and cancellation. Kuruppu and Moore (2008) examined PhD dissertations to determine the ages and types of resources cited, as well as journal title dispersion.

Citation analysis can also be a tool for assessing the citation habits of undergraduate students (Knight-Davis and Sung, 2008). Mill (2008) analyzed the citations of a random sample of bibliographies drawn from a college-wide collection of undergraduate papers to determine the types of resources cited, as well as library ownership of books and journals. Leiding (2005) studied undergraduate honors thesis bibliographies to highlight resource use patterns and collection weaknesses. Kriebel and Lapham (2008) used social science honors theses to determine the proportionate use of print and electronic studies. Hovde (2000) explored freshman English papers to determine the type of work cited, the origin of the citation, and characteristics of the journal citations, and suggested that student bibliographies are a flexible, non-invasive, and time-efficient method for assessing student library use. Carlson (2006) studied bibliographies from student research papers across class levels, disciplines, and course levels.

Several papers focus on the use of citation analysis studies for informing or assessing library instruction. Burvand and Pashkova-

Balkenhol (2008) looked at undergraduate use of government information and suggested incorporating more government information in standard library instruction, while Cooke and Rosenthal (2011) examined the citation habits of students who had received library instruction versus those who had not. Clark (2010) researched the citation habits of students who had received online versus face-to-face instruction.

### Setting

The University of South Alabama is a co-educational, public university located in Mobile, Alabama. According to the USA Office of Institutional Research, Planning, and Assessment, the enrollment at USA in the fall of 2009, at the time this study began, was 14,522 students, of whom 10,934 were full-time students. The undergraduate population in the fall of 2009 was 11,250 students. The mean ACT composite score for first-time, full-time, freshmen was 21.7, compared to 20.3 for Alabama and 21.1 nationwide.

**Table 1 – Disciplines and Included Majors**

<b>Business</b>
Business Administration (n=4)
Finance (n=1)
Marketing (n=1)
<b>Health Sciences</b>
Biomedical Sciences (n=26)
Nursing (n=1)
Pre-professional Health Sciences (n=1)

The honors program at the university is a competitive program to which approximately 35-45 students are admitted per year, but due to attrition, class numbers fall to the 20s by senior year. These students take designated honors classes as well as regular undergraduate courses and must complete a senior thesis at the end of their studies to graduate with honors. The library holds copies of all completed honors theses.

### Methodology

This study examined all 88 undergraduate honors theses submitted to the University Library at the University of South Alabama from 2002 to 2009. The theses represented 23 undergraduate majors, which for the purposes of this study were grouped into five major disciplines (business, health sciences, humanities, social sciences, and science, technology, engineering and mathematics (STEM)). Business had the fewest theses (six) and health sciences the most (28).

<b>Humanities</b>	
English (n=6)	
Foreign Languages and Literatures (n=2)	
Music (n=1)	
Studio Art (n=1)	
<b>Social Sciences</b>	
Anthropology (n=5)	History (n=4)
Communication (n=2)	Political Science (n=2)
Criminal Justice (n=1)	Psychology (n=4)
Elementary Education (n=2)	
<b>Science, Technology, Engineering, and Mathematics (STEM)</b>	
Biological Sciences (n=11)	Computer and Information Sciences (n=2)
Chemistry (n=6)	Mathematics and Statistics (n=1)
Civil Engineering (n=1)	Meteorology (n=3)

The author photocopied the title page and bibliographies of the theses and recorded the department, discipline, publication date, and total number of citations in an Access database. Bibliographies did not include the student's name. Each citation was classified as one of eight resource types: book, journal, magazine, newspaper, conference proceeding, thesis/dissertation, website, or other. To determine the age of books and journals cited, the difference between the publication date of the thesis and the book or journal was calculated. This calculation excluded citations lacking dates.

The author checked the library catalog for each distinct book title to determine local

ownership. For journals, library holdings and dates of coverage for each title were checked, as well as the format of the journal in the library's current holdings. An article was marked as in the library's collection if the issue number fell within the determined dates of ownership.

## Results

The study examined 2301 citations from 88 theses. Table 2 shows the number of theses and citations, the minimum and maximum number of citations and the mean and median number of citations overall and by discipline.

**Table 2 – Citations by Discipline**

<b>Discipline</b>	<b>Number of Theses</b>	<b>Number of Citations</b>	<b>Minimum Number of Citations</b>	<b>Maximum Number of Citations</b>	<b>Mean Number of Citations</b>	<b>Median Number of Citations</b>
<b>Business</b>	6	107	12	31	17.8	16.5
<b>Health Sciences</b>	28	476	6	58	17.0	13.5
<b>Humanities</b>	10	371	10	112	37.1	19.5
<b>Social Sciences</b>	20	852	8	340	42.6	23.5
<b>STEM</b>	24	495	6	42	20.6	21.0
<b>Total</b>	88	2301	6	340	26.1	19.0

The mean number of citations across disciplines was 26.1 (median 19.0). The minimum number of citations in a thesis was six, while the maximum was 340. Theses from health sciences had the shortest average bibliography length, with a mean of 17.0 (median 13.5), while social sciences theses had the longest average bibliographies, with a mean of 42.6 (median 23.5).

Books and journals accounted for most of the citations in all disciplines with the exception of social sciences where

newspapers and magazines accounted for 32% and 6% respectively. Web sources comprised 5% of citations, magazines 3%, conference proceedings 1%, theses and dissertations less than 1% and other sources 3%. USA’s library currently has 62% of the cited journals in print and electronic format, 31% in electronic format only, and 3% in print format only. It is likely that at the time the theses were done the percentage of print journals was higher, since the library has been switching many journals from print to online only.

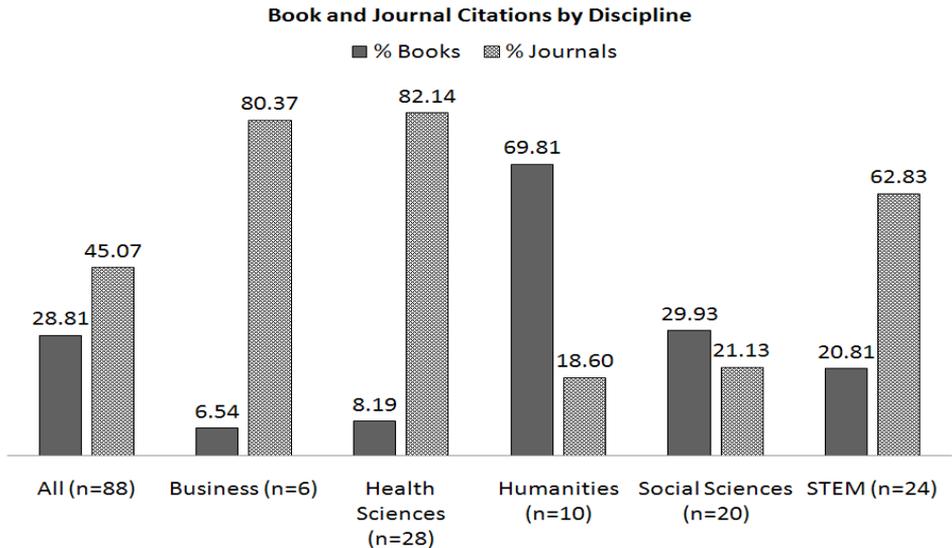
**Table 3 – Citations by Resource Type and Discipline**

Resource Type	Business		Health Sciences		Humanities		Social Sciences		STEM		All Disciplines	
<b>Book</b>	7	6.54%	39	8.19%	259	69.81%	255	29.93%	103	20.81%	663	28.81%
<b>Journal</b>	86	80.37%	391	82.14%	69	18.60%	180	21.13%	311	62.83%	1037	45.07%
<b>Magazine</b>	7	6.54%	1	0.21%	12	3.23%	54	6.34%	3	0.61%	77	3.35%
<b>Newspaper</b>	1	0.93%	11	2.31%	2	0.54%	273	32.04%	0	0.00%	287	12.47%
<b>Conference Proceeding</b>	1	0.93%	5	1.05%	2	0.54%	3	0.35%	12	2.42%	23	1.00%
<b>Thesis/Dissertation</b>	0	0.00%	1	0.21%	0	0.00%	3	0.35%	10	2.02%	14	0.61%
<b>Website</b>	4	3.74%	5	1.05%	11	2.96%	63	7.39%	34	6.87%	117	5.08%
<b>Other</b>	1	0.93%	23	4.83%	16	4.31%	21	2.46%	22	4.44%	83	3.61%

Overall, journals accounted for 45% of citations and books for 29%, but there were percentage distribution differences by discipline. Journals comprised 80% of citations for business, 82% for health sciences, and 62% for STEM.

Unsurprisingly, the humanities relied on books heavily, using them for 70% of sources. The social sciences used books for 30% of citations and journals for 21%. Newspapers were heavily cited in the social sciences, particularly in the field of history.

**Figure 1 – Book and Journal Citations by Discipline**



Students cited a total of 502 distinct journals and 602 distinct books. The library holds 93% of the journal titles and 54% of the book titles. Table 4 shows the holdings of books and journals by discipline. Journal

holdings by discipline ranged from 85% for business to 93% for health sciences, while book holdings ranged from 26% for health sciences to 66% for business.

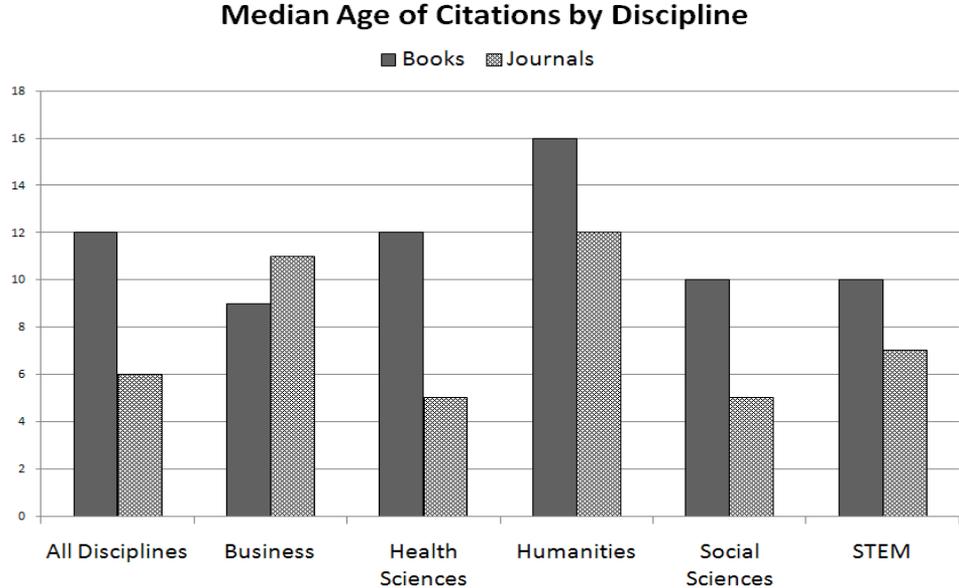
**Table 4 – Library Holdings of Books and Journals**

Discipline	Books	Journals
Business	66.67%	84.71%
Health Sciences	26.47%	93.35%
Humanities	66.82%	86.76%
Social Sciences	60.74%	90.56%
STEM	54.46%	91.64%
All Disciplines	60.36%	91.21%

For all disciplines, the median age of books cited was 12 years, and the median age of journals cited was 6 years. In the humanities, the median age of books was 16

years, while 12 years was the median for journals. In health sciences, the median age of books was 12 years, and journals had a median age of 5 years.

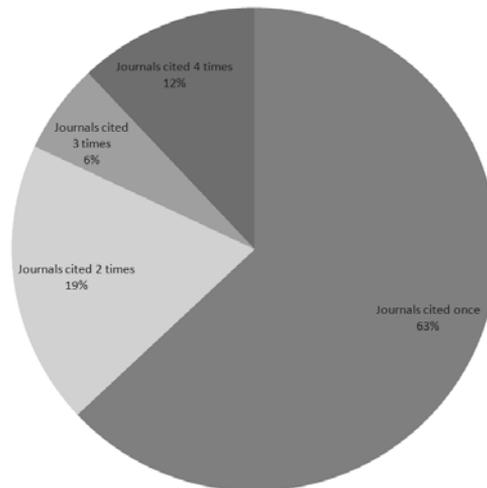
**Figure 2 – Median Age of Citations by Discipline**



Of the 502 distinct journals cited, 63% were cited once, 19% were cited twice, 6% were cited three times, and 12% were cited four times.

**Figure 3 – Citation Frequency of Distinct Journals**

**Citation Frequency of Distinct Journals  
(n = 502)**



## Discussion

USA's journal ownership rate of 91% is higher than the 62.7% found by Mill (2009) and 58.2% found by Leiding (2005). However, Mill's study was done at a much smaller college with considerably fewer electronic database subscriptions and thus is not an ideal comparison (Mill, 2008). The institution studied by Leiding (2005) is comparable in size to USA; however, the theses were done over an earlier time period (1993-2002) when fewer journals were available in electronic format. At USA, electronic holdings dominate the journal collection.

Several questions arise from these results. Since the library holds 91% of the journals, does this indicate that those library holdings are well-matched to the students' needs? It

could indicate that students are only working with the library's existing collection. For those students who cited articles not held by the library, how did they obtain these articles? This study did not look at interlibrary loan usage, a likely source. Anecdotal evidence suggests that in some cases the students received articles directly from their adviser or from informal department libraries whose holdings are not reflected in the University Libraries system.

The book ownership rate of 60% is comparable to the 62% found by Mill (2008) and 65.4% found by Leiding (2005). Due to the specialized nature of topics chosen for honors theses, the lower level of book ownership is understandable. Students conducting such research can be expected to use interlibrary loan services, and again may have obtained the books through means such

as informal department libraries, contact with advisers, and the purchase of needed book titles.

A troubling finding of the study is the age of materials cited. While it is understandable that the median age of books cited in the humanities was older than that of other disciplines, several other disciplines relied on sources that were older than expected. In particular, the median age of book citations in health sciences was 12, while that for journals was five. Given the rapidly changing nature of the field, the use of more recent information is essential. It seems that students may not have considered timeliness of sources when selecting them, a major shortcoming.

This study has several limitations. As it looked at citations in aggregate, it cannot provide insight into individual usage of the library, as an examination of individual bibliographies would. Also, this study looked only at the bibliographies of the theses and did not examine how sources were cited in the text, so it does not address whether the selected sources were in fact used effectively or at all. Both of these issues could be addressed in future studies.

Actions are warranted as a result of this study. Currently there is no library instruction outreach designed to reach students in the honors programs, although faculty members may request such instruction; indeed, there has been an upswing in such requests for honors freshman seminar and honors composition during the last few years. Instruction for the honors freshman seminar focuses mainly on orienting students to the library, discussing different types of sources (with emphasis on academic sources), including honors theses. In honors composition sessions, the format varies depending on the assignments, but

generally covers search strategies and specific resources targeted to composition assignments. Honors students continue to take seminar classes, but thus far such classes have not contacted the library for instruction. As a result, a history major may complete a thesis without having had any library instruction or only instruction targeted to a 100-level composition class.

Research papers are a common assignment for honors students. However, faculty may make faulty assumptions about students' familiarity with the library research process. As Parker-Gibson (2005) notes, several assumptions are implicit in many professors' research paper assignments, including that students will:

- use library resources,
- be able to distinguish between free Web site documents and scholarly publications,
- be able to identify scholarly databases available through library websites,
- know and be able to use databases that are important in the field of study,
- use print materials as well as those available electronically,
- be willing and able to evaluate materials they have found in order to decide what is appropriate for a particular project.

Furthermore, faculty often assume that students are familiar with the research process and understand discipline-specific and research or library vocabulary (Parker-Gibson, 2005). Since students work closely with an adviser during the thesis process, honors students are presumably introduced to such discipline-specific vocabulary; however, faculty may simply refer to an article and not explicitly state that they mean a peer-reviewed or scholarly journal article.

It is unclear how much checking of sources is done by advisers and thesis committees, and, since in-text citations were not examined, this study does not address the question of appropriateness. It is noted, however, that several Wikipedia citations existed in the theses, supporting the conjecture that some faculty are not closely monitoring the sources used. Further examination of Wikipedia use is an area for future research.

Another issue highlighted by the study was that the theses contained many poorly formed citations – an issue that likely affects many undergraduate students. The practice of citation format checking before thesis publication may be merited. An initial goal of this study was to record the usage of print and electronic sources over time; however, very few of the students indicated in citations the format in which the source was retrieved, despite this information being required in several widely-used citation styles, and this aspect of the study was abandoned.

The study suggests several means of addressing these difficulties. Outreach to the honors program and its students could be done through in-class library instruction, drop-in workshops, or by developing online tutorials. These resources could be publicized for students and faculty. Since the study's completion, librarians have begun reaching out to the honors composition classes, with positive results. The library's purchase of Springshare's LibGuides software has made the creation of online guides to relevant topics and courses much simpler and many such guides have been created. Examples of topics covered include the uses and abuses of Wikipedia, MLA and APA style in brief, ascertaining whether a source is scholarly, and locating full-text scholarly articles. Over the summer

of 2011, the author created a series of online screencast tutorials using Adobe's Captivate software, which have been embedded in various LibGuides. Workshops on research resources, strategies, and tools are in the planning stages.

More in-depth options also exist. Semester-long information literacy credit courses would be one option; however, due to the curriculum planning technicalities, the implementation of such a course in the context of USA would be difficult and time-consuming. However, a new opportunity for information literacy instruction presented itself in the fall of 2011, when the university introduced learning communities. A major objective of these communities is to promote information literacy and critical thinking skills, and the director of the learning communities has reached out to the library for assistance in this area.

Another option is collaboration between faculty and librarians to incorporate information literacy into courses other than those in learning communities. For honors students, a seminar course may be a particularly apt choice. Carlin and Damschroder (2009) discussed the work of a librarian and an art historian to develop such a seminar at the University of Cincinnati. During the fall of 2011, the author worked with a section of honors composition taught as a seminar entitled "The Hero's Journey." Students in the class examined different types of sources, evaluating them for appropriateness, and discovered that in this case, the web did not rule. Several students remarked that using article databases was a more efficient process for their projects than searching the web. This realization will carry over to future classes and research experiences and help to inform the students' research process as they work on their theses.

Perhaps the most valuable use of this study will be to open a dialogue with the honors program in which academic faculty and library faculty can collectively address the issues revealed by the study. The attrition rate of the honors program is one issue that could potentially be ameliorated by increased information literacy instruction throughout all four years of the students' college careers.

The study results may also help non-library faculty and administrators realize the importance of incorporating information literacy into all courses in a substantive manner. Furthermore, the study's results support the case for a for-credit information literacy course at the University of South Alabama, not solely for honors students but for all students.

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